

## ***Synaphea brachyceras* (Proteaceae: Conospermeae), new species from the Arthur River area in south-west Western Australia**

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### **Abstract**

Butcher, R. *Synaphea brachyceras* (Proteaceae: Conospermeae), a new species from the Arthur River area in south-west Western Australia. *Nuytsia* 13(2): 265–271 (2000). *Synaphea brachyceras* R. Butcher, an apparently rare taxon from the Arthur River area of Western Australia is described, and its affinities discussed. Illustrations of the species and a distribution map are also provided.

### **Introduction**

The genus *Synaphea* R. Br. (Proteaceae: Conospermeae) comprises 50 named species following the “Flora of Australia” treatment published by A.S. George (1995). Prior to this treatment, *Synaphea* had not been revised since “Flora Australiensis” (Bentham 1870) when eight species were recognized. Of the 54 taxa in *Synaphea*, 38 are currently included in the Department of Conservation and Land Management’s “Declared Rare and Priority Flora List” (Anon. 1997), with *S. quartzitica* A.S. George a recent inclusion as Declared Rare Flora and *S. stenoloba* A.S. George in the process of being gazetted as such. *Synaphea* is endemic to the South West Botanical Province and the South-western Interzone of Western Australia, and ranges from Kalbarri National Park in the north to the Nuytsland Nature Reserve in the south-east, with some extension inland beyond Southern Cross.

The author is currently undertaking further revision of the genus as a number of species complexes (e.g. *S. spinulosa* (Burm.f.) Merr. and *S. petiolaris* R. Br.) are still problematic, as is the delimitation of morphologically similar taxa. Additionally, the high level of polymorphism displayed by some species with regards to leaf and stigma morphology, floral size and degree of indumentum, has made the delimitation of taxon boundaries difficult, and as more material is collected, the current taxonomy becomes increasingly difficult to apply. A specimen of *Synaphea* collected by V. Crowley in 1995 and lodged at the Western Australian Herbarium brought to light an apparently new taxon which is here described, before completion of the full revision, in view of its apparent rarity.

### **Methods**

This study is based on observations of live plants in the field as well as examination of herbarium collections from PERTH, including the type material of 36 taxa and type photographs of 13 taxa

described in George (1995). Measurements of leaves and habit were made from dried herbarium specimens and floral characters were measured from fresh, reconstituted and pickled (70% ethanol) material. Illustrations of floral and foliage features were prepared by the author.

### Taxonomy

*Synaphea brachyceras* R. Butcher, *sp. nov.*

? *Synaphea favosa* var. *lanceolata* Meisn. in A.L.P.P. de Candolle, Prodr. 14: 314 (1856). *Type*: Swan River Colony [Western Australia], J. Drummond 3rd coll. 258 (*syn*: BM, K, *n.v.*).

Folia integra vel pinnatifida, ad apicem obtusa vel acuta, reticulo tenui atque profundo vel foveato. Perianthium in demidio inferiore glabratum vel puberulum. Tepalum adaxiale 4.1–5.5 mm longum, 1.7–2.4 mm latum. Tepalum abaxiale 2.5–3.7 mm longum, 0.7–1.9 mm latum, ad apicem valde recurvatum. Stigma manifeste bicornis, et super pagina dorsali cornu parvo recurvo instructum, 1.2–1.5 mm longo, 0.9–1.6 mm lato.

*Typus*: north-west of Arthur River [precise locality withheld], Western Australia, 29 September 1998, R. Butcher & J.A. Wege RB 498 (*holo*: PERTH 05495660; *iso*: CANB, K, MEL, NSW).

Caespitose *subshrub* to 50 cm tall, 20–90 cm wide. *Stems* several, to 15 cm long, appressed-pubescent on upper stems. *Petioles* 3.5–20 cm long, glabrous to shortly pubescent, with scattered long hairs; sheath appressed pubescent. *Leafblades* entire and oblanceolate or three-lobed to pinnatipartite with the lowest pair of lobes again pinnatipartite; ultimate lobes linear to lanceolate; apices rounded to acute, shortly pungent; 6.5–17.5 cm long, 0.6–1.7 cm wide, sub-glabrous to shortly pubescent, with scattered long hairs; reticulation fine and deep to pitted. *Inflorescence* a spike, 2.5–15 cm long, shorter than or just exceeding the leaves; flowers moderately crowded, internodes half to *c.* equal the flower length; peduncle 2.5–17 cm long, simple to little-branched, appressed puberulous to pubescent; rachis appressed pubescent; bracts ovate, obtuse, 1–1.5 mm long, pubescent at base, glabrous toward apex with ciliate margin. *Perianth* ascending, gaping, externally glabrescent to sparsely puberulous in lower half; adaxial tepal concave, margins reflexed towards apex, 4.1–5.5 mm long, 1.7–2.4 mm wide, sparsely puberulous internally in the distal half; abaxial tepal convex, 2.5–3.7 mm long, 0.7–1.9 mm wide, apex acute and strongly reflexed to 0.6–1 mm of its length, pubescent internally behind the anther; lateral tepals falcate, 2.7–4 mm long, 1.5–3.1 mm wide, the apex reflexed to 0.7–1.4 mm of length, puberulous internally behind the anthers. *Stigma* transversely elliptic to elliptic, convex, 1.2–1.5 mm long, 0.9–1.6 mm wide, with two divergent, reflexed horns 0.7–1 mm long, the dorsal surface of the stigma with a short, curved projection of *c.* 0.3 mm length; ovary cylindrical to ellipsoid, with apical beak to 0.2 mm long (after style separates), sericeous, *c.* 0.9 mm long, 0.5 mm wide, with a ring of translucent gland-like hairs at apex. *Fruit* elliptic, with a beak to 0.5 mm long, pubescent, *c.* 4.5 mm long. *Seed* narrowly turbinate, *c.* 2.2 mm long, 0.9 mm wide; testa cream, smooth. (Figure 1 A–J)

*Other specimens examined*. WESTERN AUSTRALIA [precise localities withheld]: NW of Arthur River, 28 Sep. 1998, R. Butcher & J.A. Wege RB 497 (PERTH); NW of Arthur River, 29 Sep. 1998, R. Butcher & J.A. Wege RB 499 (PERTH); NW of Arthur River, 30 Sep. 1997, R. Butcher, J.A. Wege & C.F. Wilkins RB 307 (PERTH); NW of Arthur River, 30 Sep. 1997, R. Butcher, J.A. Wege & C.F. Wilkins RB 308 (PERTH); NW of Arthur River, 30 Sep. 1997, R. Butcher, J.A. Wege & C.F. Wilkins

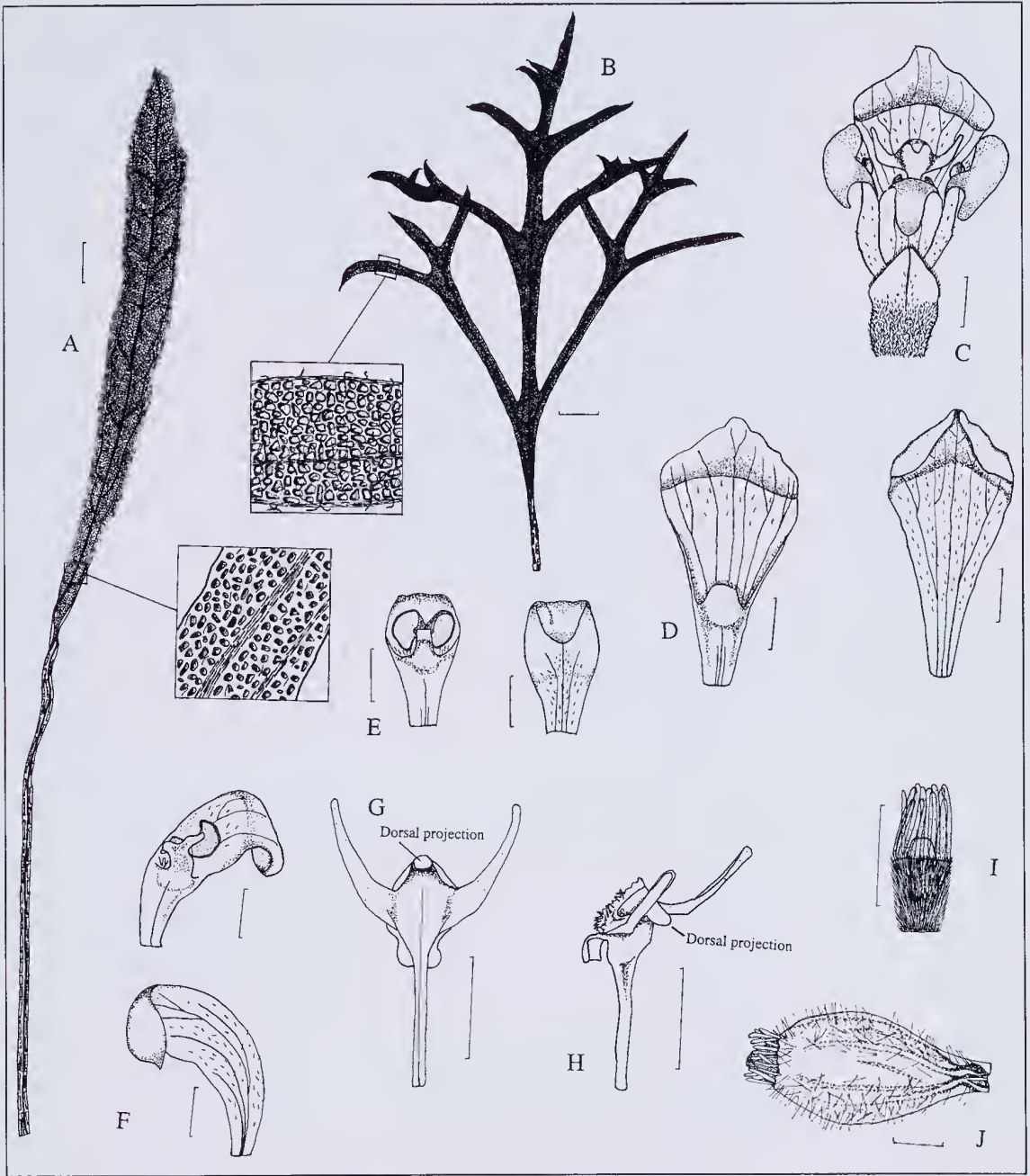


Figure 1. *Synaphea brachyceras* A – simple leaf with detail of pitted reticulation; B – pinnatipartite leaf with detail of deep reticulation and scattered hairs; C – flower viewed from the abaxial surface showing the widely opening perianth and bract glabrescent in the upper half; D – adaxial tepal, inner surface (left) with sterile anther filament and outer surface showing reflexed margins at apex; E – abaxial tepal, inner surface (left) with bilocular anther and outer surface showing strongly reflexed apex; F – lateral tepal, inner surface (above) showing unilocular anther and outer surface with reflexed apex; G – dorsal surface of stigma showing divergent horns and projection (arrowed); H – stigma viewed from side showing convex ventral surface and connective tissue and small, recurved dorsal horn; I – sericeous ovary with apical glands; J – nut, Figures A and B drawn from R. Butcher, J.A. Wege & C.F. Wilkins RB 309 and R. Butcher, J.A. Wege & C.F. Wilkins RB 308 respectively. Figures C–L drawn from R. Butcher, J.A. Wege & C.F. Wilkins RB 307. Figure M drawn from R. Butcher & J.A. Wege RB 499. Scale bar = 1 mm, except A and B, where scale bar = 1 cm.

RB 309 (PERTH); NNE of Arthur River, 30 Aug. 1995, *V. Crowley* DKN 140 (PERTH); NNE of Arthur River, 30 Aug. 1995, *V. Crowley* DKN 142 (PERTH); E of Dardadine, 22 Oct. 1995, *V. Crowley* DKN 141 (PERTH); NW of Arthur River, 24 Sep. 1998, *M. Graham* MSG 985 (PERTH); Quinns Block State Forest 52, SW of Highbury, 28 Sep. 1998, *G. Warren* 62 (PERTH).

*Distribution.* *Synaphea brachyceras* is restricted to a few small reserves and roadside remnants in the Arthur River–Highbury area, c. 200 km SE of Perth (Figure 2). Fieldwork carried out in 1997 and 1998 around Hillman, Dardadine, Tarwonga and Piesseville failed to locate additional populations. Further survey in surrounding areas is urgently required in light of the rarity of this species.

*Habitat.* *Synaphea brachyceras* has been collected from red-brown clayey sand over laterite and grey sandy gravel over granite. Associated vegetation includes *Eucalyptus wandoo* open woodland with a low shrub understorey comprising *Isopogon teretifolius* and species of *Dryandra*, *Beaufortia*, *Bossiaea*, *Hibbertia*, *Dampiera*, *Leptospermum* and *Hypocalymma*, as well as *Allocasuarina humilis* and *Hakea trifurcata* open scrub over a low heath of *Adenanthos flavidiflorus*, *Dryandra cuneata* and *Xanthorrhoea* sp. with occasional *Nuytsia floribunda* and *Banksia attenuata*. In undisturbed populations *S. brachyceras* has a scattered distribution, but in highly disturbed populations it is common along the edges of tracks and gravel scrapes suggesting that it may be a disturbance opportunist.

*Phenology.* Flowers of *Synaphea brachyceras* have been recorded from August to October with fruits recorded in November and December.

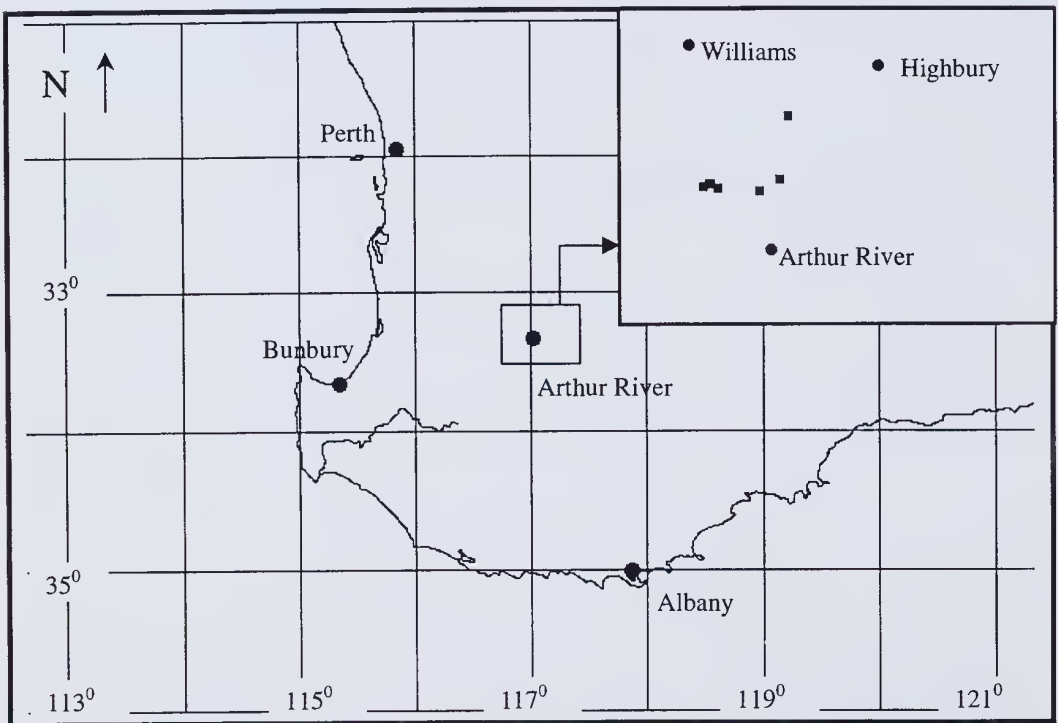


Figure 2. Distribution of *Synaphea brachyceras* to the north and north-west of Arthur River.

*Etymology.* The specific epithet is derived from the Greek *brachys* meaning “short” and *ceras* meaning “horn” in reference to the projection on the dorsal surface of the stigma.

*Conservation status.* CALM Conservation Codes for Western Australian Flora: Priority Two. This coding is considered appropriate in light of the apparently restricted distribution of *Synaphea brachyceras*, but with some plants in reserves, and the large amount of land under cultivation in the Arthur River–Highbury area.

*Affinities.* *Synaphea brachyceras* is somewhat anomalous with regard to the existing infrageneric classification of *Synaphea*, and as such is not placed in any section pending the completion of a full taxonomic revision. It appears to show greatest affinity to members of section *Bicornis* A.S. George, with which it shares prominent stigmatic horns. However, the new species could not be placed there without altering the current delimitation of the section (George 1995), as it does not possess entire to shortly dentate leaves and has stigmatic horns which are divergent rather than erect to incurved.

In both floral and vegetative characters, *S. brachyceras* most closely resembles *S. favosa* R. Br., with both species possessing gaping, glabrescent to puberulous perianths, bracts that are glabrous in the distal half and fine, deep to pitted reticulation on the leaf lamina. *S. brachyceras* can be differentiated from *S. favosa* by its deeply divided, 3-lobed to pinnatipartite leaves, but, as is common in this variable genus, a degree of overlap is evident in leaf morphology between these two taxa. For example, whilst *S. favosa* typically possesses oblanceolate to obovate leaves, or leaves that are cuneate with three broad, obtuse lobes, three collections from the Cranbrook area (*Steward s.n.*, *Davis* 6434 and *Butcher & Wege* RB 501) have deeply divided leaves with acute apices that are similar to those of *S. brachyceras*. Similarly, oblanceolate leaves, which usually occur in *S. brachyceras* as juvenile, or post-disturbance foliage, can also occur on the mature plant (*Crowley* DKN 142 and *Graham* MSG 985), although they are longer and narrower in this species than in *S. favosa* (7.5–17.5 x 0.6–1.3 cm compared with 5–12 x 1.5–3 cm).

These two taxa can be differentiated by their habit also as *Synaphea favosa* is typically prostrate or decumbent whilst *S. brachyceras* is a domed sub-shrub. The flowers of *S. favosa* are generally larger than those of *S. brachyceras* (adaxial tepals 5.2–6.8 mm long compared with 4.1–5.5 mm) and the tepals are hairier both externally, over the entire perianth, and internally behind the anthers. However, some smaller-flowered *S. favosa* specimens from the south coast (e.g. *Croxford* 5772, *Hoyle* 1382, *Cranfield* 4998 and *George* 14381) with widely gaping tepals and stigmas lobed to less than half their length, have adaxial tepals in the range of *S. brachyceras* (3.9–4.9 mm long). These may represent an undescribed taxon or possibly be the result of damage through insect galling, a condition seen in a number of other taxa.

Whilst there may be some overlap between *Synaphea brachyceras* and *S. favosa* with regard to leaf morphology and flower size, these two species can be easily differentiated by their stigma morphology. In *S. favosa* the stigmatic lobes are usually parallel and more or less erect and there is moderate thickening of the dorsal surface of the stigma, whilst in *S. brachyceras*, the stigmatic horns are divergent and reflexed and the dorsal surface bears a pronounced, recurved projection. Within sect. *Bicornis* both *S. reticulata* (Sm.) Druce and *S. hians* A.S. George also have dorsal thickening of the stigma but both these species have a longer stigma (1.5–2.5 mm) with erect horns and the thickening is ridge-like rather than a recurved projection. These two taxa can be further distinguished from *S. brachyceras* by their cuneate leaves, pubescent perianth and long (2–6 mm), villous bracts.

Vegetative specimens of *Synaphea brachyceras* could be confused with *S. interioris* A.S. George of sect. *Synaphea*, as both species have similar leaf morphology. However, *S. interioris* can be

distinguished from *S. brachyceras* by the very fine and shallow reticulation on the leaf lamina, as well as the broader, less divided leaf lobes, the lowest of which are usually curved downwards. Similarly, specimens of *S. brachyceras* having only simple leaves on the plant can be distinguished from the wheatbelt species *S. platyphylla* A.S. George which possesses very shallow reticulation on the leaf lamina, and a stigma which is square to obtrapeziform and lobed to approximately a third of its length without a dorsal projection.

In its divergent stigmatic horns, *S. brachyceras* is akin to *S. nexosa* A.S. George which has long lobes at the apex of the stigma like members of sect. *Bicornis*, but is included in sect. *Synaphea* due to its deeply divided leaf lamina (A.S. George). *S. brachyceras* can be easily differentiated from *S. nexosa* as its leaves have pinnatipartite division, acute apices to the lobes and fine, deep to pitted reticulation whilst those of the latter taxon have tripartite division, obtuse to rounded apices to the leaf lobes and open, shallow reticulation. Additionally, *S. brachyceras* has its inflorescences shorter than to shortly exceeding the leaves whereas *S. nexosa* has its flower spikes greatly exceeding leaf length. Although *S. petiolaris* subsp. *triloba* A.S. George is very similar to *S. nexosa*, no members of the *S. petiolaris* species complex have been included in this discussion for the sake of simplicity, as the taxonomy of this group is far from resolved and their inclusion does little to further the purpose of this paper.

*Notes.* The name *Synaphea favosa* var. *lanceolata* Meisn. may belong in synonymy with *S. brachyceras*, but the available syntype and isotype material examined is sterile and this remains a name of uncertain application.

#### Amendments to key in "Flora of Australia"

The recognition of *S. brachyceras* requires some amendments to be made to the existing key to species (George 1995), although the only changes suggested here are to facilitate the distinction of *S. brachyceras*. Two new couplets (3 and 7), are required, with the original couplet 3 now designated '3a'. Some changes are also necessary to size ranges in some of the couplets; all modifications and new couplets are marked with an asterisk. The following extract may be inserted at the start of the key in George (1995).

1. Stigma divided to half-way or more into 2 narrow horns
- 2 Leaf lamina deeply divided into linear to lanceolate, obtuse (rarely acute) lobes
  - \*3 Mature leaves trilobed to pinnatipartite; reticulation very fine and deep; inflorescence shorter than or shortly exceeding leaves [Arthur River area] ..... **S. brachyceras**
  - \*3: Mature leaves once or twice trilobed; reticulation open and shallow inflorescence greatly exceeding leaves
    - 3a Shrub to 60 cm tall; petiole to 20 cm long; peduncle to 35 cm long; fruit 5–6 mm long [Perth to Busselton and E to Cape Arid] ..... **S. petiolaris**
    - 3a: Shrub to 1 m tall; petiole often 20–30 cm long; peduncle to 60 cm long; fruit 8–9 mm long [Scott River] ..... **S. nexosa**
- 2: Leaf lamina entire to dentate or shortly lobed with triangular lobes
  - 4 Leaves obovate to oblanceolate

- 5 Adaxial tepal 4.2 mm long; spikes greatly exceeding leaves  
[Busselton area] ..... **S. petiolaris**
- \*5: Adaxial tepal 4.1–6.5 mm long; spikes not or only shortly  
exceeding leaves
- \*6 Leaves finely pitted; bracts 1–1.5 mm long; stigma 1.2–1.5 mm long
- \*7 Stigma with prominent curved horn on dorsal surface  
[Arthur River area] ..... **S. brachyceras**
- \*7: Stigma without prominent curved horn on dorsal surface  
[Rocky Gully to Bremer Bay] ..... **S. favosa**
- 6: Leaves shallowly reticulate; bracts 3–3.5 mm long;  
stigma 1.5–2 mm long [Yallingup to Kojonup] ..... **S. floribunda**

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